



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Krutchinsky, et al.

Examiner: Paul M. Gurzo

Serial No.: 10/657,580

Group Art Unit: 2881

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For: METHOD OF TRANSMITTING
IONS FOR MASS SPECTROSCOPYCommissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450*I hereby certify this correspondence is being
deposited with the United States Postal Service as
first class mail, postpaid in an envelope,
addressed to:**Commissioner for Patents, P.O. Box 1450,
Alexandria, VA 22313 on May 21, 2004*Signature: DECLARATION UNDER 37 C.F.R. §1.132

Sir:

I, ANDREW KRUTCHINSKY, declare and say:

1. I am a co-inventor of the above-identified patent application, and a co-inventor of International Patent Application No. PCT/CA99/00034 published in International Publication No. WO 99/38185. In addition, I am an expert in the design and operation of mass spectrometers and the components thereof.

2. I am making this Declaration in support of Applicants' response to an Office Action dated February 23, 2004. In the Office Action, the Examiner has cited International Publication No. WO 99/38185 in rejecting the claims of the application. I have reviewed the aforementioned reference in order to prepare this Declaration.

3. The purpose of this Declaration is to comment on the portion of Applicants' disclosure that concerns the simultaneous damping and acceleration of ions within the ion guide/accelerator 14 in light of the prior art of record. Referring to Figure 1 of the patent application, the ion guide/accelerator 14 includes a multipole rod set at 18 and an accelerator rod set 20 in a collinear arrangement in the presence of a high pressure gas. The presence of the high pressure gas dampens the velocity of the ions while the accelerator rod set provides for the acceleration of the ions within the ion guide/accelerator 14. More particularly, the high pressure gas dampens both an axial and radial component of the ion's trajectory with respect to axis 54. Meanwhile the accelerator rod set 20 offsets the dampening effect along

the axis 54, and results in the ions achieving a constant terminal velocity. This terminal velocity is determined by the opposing effects of the ion acceleration force and the drag force caused by collision of the ions with the gas molecules. The damping and acceleration occur along the entire length of the ion guide/accelerator 14 to provide a funnel effect that yields an ion beam with small diameter and narrow velocity distribution along the axis.

4. Referring now to Figure 1 of International Publication No. WO 99/38185, the mass spectrometer disclosed therein includes a collisional focusing chamber 2 that is filled with a buffer gas and a multipole 3 which is driven at some RF voltage. (See Page 10, lines 3 through 6). The buffer gas within the collisional focusing chamber 2 is responsible for damping the initial velocity of the ion and focusing the ion towards the central axis. (See page 10, lines 7 through 11). The multipole 3 disclosed in the WO 99/38185 publication does not accelerate ions within multipole 3 except as noted below in connection with the fringing fields that are present at the entrance and exit of the multipole.

5. Referring now to Figure 2 of International Publication No. WO 99/38185, the mass spectrometer disclosed therein includes a vacuum chamber 30 that is filled with a buffer gas and a two quadrupole rod sets 31 and 32. (See Page 11, line 20 through Page 12, line 4). In the Office Action, the Examiner has noted that WO 99/38185 publication discloses at Page 7, Line 29 through Page 8, Lines 1-5 that:

"[a] potential difference can be provided between two adjacent rod sets sufficient to accelerate ions into the downstream rod set, to cause collisionally induced dissociation in the downstream rod set."

The reference to the "two adjacent rod sets" above refers to the quadrupole rod sets 31 and 32 shown in Figure 2. The downstream rod set 32 operates essentially as an ion guide while the upstream rod set 31 is used as a mass filter. (See Page 19, line 28 through Page 21, line 4).

6. Based upon my expertise with mass spectroscopy, please be advised that there are fringing fields associated with quadrupole rod sets such as those disclosed by International Publication No. WO 99/38185. These fringing fields are well known to those skilled in the art and are understood to provide an acceleration to ions at the entrance and exit of the quadrupole rod set, but not along the entire length of the quadrupole rod set. In particular, it is also well known that the acceleration associated with the fringing fields at the ends of the quadrupole rod set only occurs over a length equal to about the diameter of the rods used in the quadrupole rod set. The magnitude of the acceleration within the quadrupole

is greatest at the end and decreases at about an exponential rate to zero. Further, I note that the specific language referred to at Page 8, Line 4 indicates that the "potential difference . . . accelerates ions into the downstream rod set" (emphasis added).

7. Based upon my expertise with mass spectroscopy, please also be advised that mass filters such as the upstream rod set 31 disclosed by International Publication No. WO 99/38185 generally require a substantial length for filtering ions. In addition, those skilled in the art recognize that substantially long continuous rods offer distinct advantages over a plurality of short rods when the desired goal is to filter ions.

8. As noted above, the accelerator rod set 20 of the present invention provides an acceleration of the ions along their path through the ion guide/accelerator 14. The WO 99/38185 publication does not disclose any structure or method that those skilled in the art would consider as an accelerator for accelerating ions along the entire length of a rod set located between a first mass spectroscopy device and a second mass spectroscopy device. More importantly, the WO 99/38185 publication does not disclose or suggest an "accelerator rod" in accordance with the present invention.

9. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true. Further that these statements were made with the knowledge that willfully false statements, and the like, made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willfully false statements may jeopardize the validity of the application of any patent issued thereon.

Date

May 21, 2004


Andrew Krutchinsky

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